

# RAFT IDEAS

**Topics:** Biology,  
Genetics, DNA

## Materials List

- ✓ Chenille stems
- ✓ Pony beads of 6 colors

This activity can be used to teach:

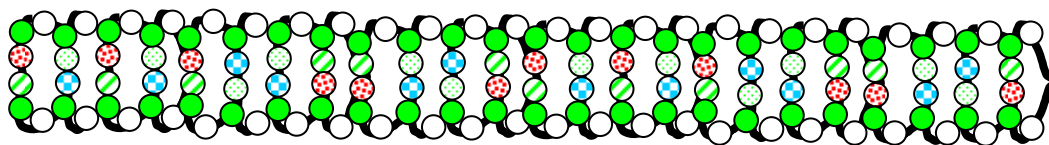
CO Science Standard 2:  
Life Science

- DNA structure and function
  - Molecules of organisms
- 21<sup>st</sup> Century Skills
- Critical Thinking and Reasoning

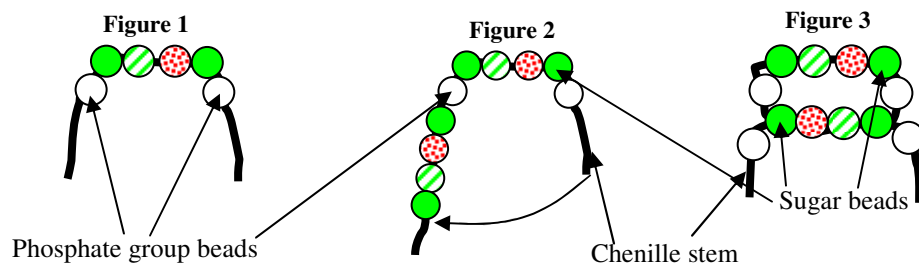
Grades: 1, 7, 8, HS



## Modeling DNA, the Code of Life Just Add a Twist



This simplified DNA model uses beads and chenille stems to represent nucleotide components.



### To Do and Notice

1. Assign the bead colors to DNA model parts: 1 color of bead to represent sugar, 1 color to represent the phosphate group, 4 colors to represent the bases (1 color for each: adenine, thymine, guanine, cytosine).
2. String 6 beads onto a chenille stem (figure 1): phosphate group, sugar, base pair, sugar, phosphate group. (NOTE: the order of bases does not matter as long as the bases are paired correctly: adenine to thymine, guanine to cytosine)
3. Add 4 beads onto one end of the chenille stem (figure 2): sugar, base pair, sugar.
4. Use the second end of the chenille stem to go BACK through the 4 new beads.
5. Add a phosphate group bead to each end of the chenille stem (figure 3).
6. Repeat steps 3 through 5 to create a piece of DNA of any desired length. Add additional chenille stems by threading them through the last few strung beads.
7. Twist the DNA strand counter-clock wise (right to left) to create a double-helix.

### The Science Behind the Activity

In 1953, Watson and Crick discovered the basis of all life on Earth: Deoxyribonucleic Acid (DNA). Its elegant, but incredibly long structure, the double helix, holds the codes for all life processes and reproduction. Complimentary strands of DNA have a backbone of phosphate and sugar plus attached bases. There are only 4 bases, and hydrogen bonds always create the same base pairs: adenine to thymine, and guanine to cytosine. Although simple in structure, DNA can code for all the complex necessities of life because of its incredible length: human DNA contains about 3 billion base pairs. If this bead model were that long, it would cover over 60,000 km (37,000 miles) and would wrap around the Earth at the equator 1½ times!

### Taking it Further

Model builders can easily string their small pieces of DNA together.

**Web Resources** (Visit [www.raft.net/more](http://www.raft.net/more) for how-to videos and more ideas!)

- DNA structure information is available at:  
<http://www.umass.edu/molvis/tutorials/dna>
- For information on the discovery of DNA, visit the Nobel website:  
<http://www.nobel.se/medicine/laureates/1962/>
- Information on the Human Genome: <http://genome.gov>